CHAPTER 4
PREPARATION OF AN ESS

4-1. Introduction. This chapter discusses the preparation of an ESS, including a description of the roles and responsibilities of USACE organizations in the preparation of an ESS, contents of an ESS, and technical references useful in the preparation of an ESS.

a. DOD is the lead agency for all OE response actions. Responsibility for executing an OE response action, and hence approval authority for an ESS, depends on whether the site is a FUDS or an active or transferring installation. The ESS approval process is discussed in Chapter 5.

(1) OE response actions at sites that were contaminated while under the jurisdiction of DOD, but which subsequently have been transferred out of DOD control (i.e., FUDS) are conducted under the DERP-FUDS program. OE response actions at FUDS are described in EP 1110-1-18. Authority for executing OE response actions at FUDS has been delegated to USACE by DOD through HQDA.

(2) Active and Transferring Installations. USACE may or may not be involved in OE response actions at active and transferring installations.

(3) Engineer Regulation (ER) 1110-1-8153, “Ordnance and Explosives Response”, provides roles and responsibilities for USACE elements in managing and executing OE response actions and authorizes and provides for the delegation of such roles and responsibilities.

b. Throughout this document, district review and approval responsibilities for project activities are discussed. These responsibilities have been delegated by the Major Subordinate Command (MSC) to the assigned district for project sites within their geographic area.

c. Districts requiring additional information beyond that discussed in this document should contact the OE MCX.

4-2. Organizational Responsibilities.

a. MSC Commanders are assigned overall responsibility for the safe and efficient execution of OE response actions for all projects for which they are the Project Manager (PM) in accordance with ER 5-1-11.

b. The responsibilities of Headquarters, United States Army Corps of Engineers (HQUSACE) for planning and executing OE response actions are discussed in ER 1110-1-8153 and EP 1110-1-18.

c. USATCES is responsible for review and approval of ESSs at DA.

d. DDESB is responsible for review and approval of ESSs at DOD.

e. The responsibilities presented in this chapter are FUDS specific. For projects under the management of an active or transferring installation, the installation must retain some degree of management control. In such cases, the PM will hire the appropriate OE Design Center to provide USACE assistance in a manner that is transparent to the customer, but the PM will remain the interface with the installation.

f. It is the responsibility of all USACE personnel involved with the OE Program to safely execute OE response projects in accordance with applicable laws, regulations, and policies. All USACE organizations will ensure that all personnel involved with on-site activities at project sites are familiar with and have access to copies of the approved ESS prepared for the site-specific activities to be conducted.

g. All USACE elements will ensure that OE response actions include provisions for meaningful stakeholder involvement pursuant to all applicable laws, regulations, and policies.

4-3. Parties Responsible for Preparation of the ESS.

a. The ESS will be developed with the full involvement of the OE project team.

b. Responsibilities for preparation and approval of an ESS are discussed in chapter 5.

c. The OE project team, under the direction of the district PM, will be fully involved in the preparation of the ESS. The OE project team members include the district PM; other representatives from the district, as required; the OE Design Center; the OE MCX, as required; the Hazardous, Toxic, and Radioactive Waste (HTRW) MCX and/or HTRW Design Center, as required; federal land managers; the prime contractor PM; state and federal regulators; the Native American Tribal Government point of contact, if applicable; and other key technical and non-technical individuals, as appropriate.

4-4. Contents of the ESS. As described in Chapter 3, the four types of ESSs will contain varying types of information depending on the type of response action discussed in the ESS. Preliminary studies, OE sampling reports, and the Work Plan for the response action provide much of the required information.

a. The format for a NTCRA ESS is described in the DDESB Memorandum, "Guidance for Clearance Plans", dated January 1998. This memorandum may be found on the USATCES website at http://www.dac.army.mil/es/documents/esslist.pdf. Additional information on this type of ESS is provided in the OE MCX DID OE-060, "Conventional Explosives Safety Submission", which is located on the OE MCX website at http://www.hnd.usace.army.mil/oew/dids.asp.

b. Appendices B and C, respectively, contain example formats for the NTCRA ESS for Institutional/Engineering Controls and NTCRA ESS for a NDAI recommendation.

c. Appendix D contains an example format for a TCRA ESS.

4-5. Technical References. Table 4.1 presents a summary of technical references that may be applicable to the preparation of an ESS. These documents can be found on the OE MCX website at http://www.hnd.usace.army.mil/oew or the HQUSACE website at http://www.usace.army.mil.

Table 4.1
Technical References for Use in the Preparation of an ESS

Directive/Regulation	Title Reference	Contents
DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards, July 1999	Facilities Construction and Siting	Chapter 5 indicates that construction features and location are important safety considerations in planning facilities that are to be a potential explosive source (PES) or exposed to the damaging effects of potential explosions. The effects of potential explosions may be altered significantly by construction features that limit the amount of explosives involved, attenuate resultant blast overpressure or thermal radiation, and reduce the quantity and range of hazardous fragments and debris. Proper location of exposed sites in relations to PESs ensures against unacceptable damage and injuries in the event of an incident. This chapter contains siting and construction standards to be used within the DOD.
DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards, July 1999	Lightning Protection	Chapter 7 defines minimum explosive safety criteria for the design, maintenance, testing and inspection of lightning protection systems. Properly maintained lightning protection is required (with exceptions) for ammunition and explosives facilities. If other lightning protection systems for these facilities are used, they shall offer equivalent protection of the types prescribed in Chapter 7.
DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards, July 1999	Hazard Identification for Fire Fighting and Emergency Planning	Chapter 8 establishes standard fire fighting hazard identification measures to ensure a minimum practicable risk in fighting fires of ammunition and explosives. These identification measures are based on the classification of fires into four fire divisions according to the hazard they present. Chapter 8 establishes minimum guidelines for the development of emergency plans, including safety, security, and environmental protection, which have been coordinated with local authorities.

Table 4.1 (continued)
Technical References for Use in the Preparation of an ESS

Directive/Regulation	Title Reference	Contents
DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards, July 1999	Quantity-Distance (Q-D)	Chapter 9 indicates the damage or injury potential of explosions is normally determined by the prevailing distance between the PES and the exposed site (ES); the ability of the PES to suppress blast overpressure, primary and secondary fragments, and debris; and the ability of the ES to resist explosion effects. Chapter 9 sets minimum standards for separating a PES from an ES that takes into account anticipated explosion effects suppression and resistance. Q-D relationships are established for related and unrelated PES's and explosives and non-explosives ES's.
DDESB-KO Memorandum, 27 Oct 98	Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Ordnance and Explosives (OE) Sites, (Terminology Updated March 2000)	Indicates the Minimum Separation Distance (MSD) for all personnel will be the greater of the overpressure distance based on total net explosive weight (NEW) or the appropriate fragment range as determined by the maximum fragment range or the mitigated fragment range.
HNC-ED-CS-S-98-1	Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives, January 1998	This document details the methods used to determine fragmentation characteristics of cased explosives. An example and uses of fragmentation characteristics are discussed. Blast overpressure, thermal effects, ground shock and noise from an accidental explosion are not addressed in this document.
HNC-ED-CS-S-98-2	Method for Calculating Range to No More Than One Hazardous Fragment per 600 Square Feet, January 1998	This document details the theory and method used to determine the range to no-more-than one hazardous fragment per 600 square feet. Software has been developed using the theory described in HNC-ED-CS-S-98-2. The use of this software is described and an example detailed in this document.

Table 4.1 (continued)
Technical References for Use in the Preparation of an ESS

Directive/Regulation	Title Reference	Contents
EM 1110-1-4009	Blast and Fragment Protection in Ordnance and Explosives Response, 23 June 2000	Chapter 11 of this document describes the blast and fragment protection requirements for unintentional and intentional detonation to include a planning checklist and MSD requirements.
ENGINEERING CONTROLS		
HNC-ED-CS-S-96-8	Guide for Selection and Siting of Barricades for Selected Unexploded Ordnance, Revision 1, September 1997	This document provides information on selection and siting of barricades to defeat primary fragments from selected ordnance items. This document does not address effects from blast overpressure and noise.
HNC-ED-CS-S-97-7	Buried Explosion Module (BEM): A Method for Determining the Effects of Detonation of a Buried Munition, Revision 1, January 1998	The BEM is a software program designed to calculate the residual velocity of fragments produced by a buried munition and the maximum ejecta radius of large soil fragments produced by the buried explosion. The document discusses the theory used in BEM and the input required. Example problems are also provided in the document.
HNC-ED-CS-S-98-7	Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions, August 1998	This document provides a summary of the test results and guidelines developed for the use of sandbag enclosures for fragments and blast mitigation due to intentional detonations at OE sites. The guidelines include required sandbag thicknesses, configuration and construction of the sandbag enclosures, and exclusion zone based on sandbag throw distances.

Table 4.1 (continued)
Technical References for Use in the Preparation of an ESS

Directive/Regulation	Title Reference	Contents
ENGINEERING CONTROLS (continued)		
HNC-ED-CS-S-98-8	Miniature Open Front Barricade, November 1998	Provides guidance information on miniature open front barricades (MOFB) designed to defeat the primary fragments due to an accidental/unintentional detonation of selected ordnance during intrusive operation. The document indicates that the MOFB is not designed to mitigate the effects from blast overpressure and noise and are not intended for reuse after an incident. Guidelines include barricade design, required aluminum and sandbag thicknesses, and the required exclusion zone.
HNC-ED-CS-S-99-1	Open Front and Enclosed Barricades, March 1999 (Terminology Updated March 2000)	Provides guidance information on open front barricades (OFB) and enclosed barricades (EB) designed to defeat the primary fragments due to an accidental/unintentional detonation of selected ordnance during intrusive operations. The document indicates that OFBs and EBs are not designed to mitigate the effects from blast overpressure and noise and are not intended for reuse after an incident. Guidelines include barricade design, required aluminum and sandbag thicknesses, and the required exclusion zone.
HNC-ED-CS-S-00-3	Use of Water for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions	This document provides a summary of the test results and guidelines developed for the use of water for fragments and blast mitigation due to intentional detonations at OE sites.